| ERIC Document Resume | See Instruction Sheet | DATE OF RESUME 8/15/65 | DATE RECEIVED |
|---|---|---|---|

A. PUBLICATION DATA

| 1. ED NUMBER | 2. ORIGINATOR CONTROL NO(S). | 3. IDENTIFICATION NO. | DO NOT WRITE IN SPACE BELOW |
|---|---|---|---|
| ED000534 | 7285 | | |

4. AUTHOR(S):
McMullen, Warren Anthony

5. TITLE OF DOCUMENT ABSTRACTED:
An Investigation of the Persistence of an Indoctrinated Pattern of Experiment Planning Subsequent to the Indoctrination Period

6. PUBLICATION TITLE:
N.A.

7. EDITOR(S):
N.A.

8. PLACE OF ORIGIN
ORG. Greenville College
ST.
CITY, STATE Greenville, Illinois
TELE. EXT.
INST/LOC CODE

9. PUBLISHER OR SOURCE
Greenville College

| 10. VOL. | 11. PAGES | 12. MO./YR. | 13. TOTAL PP. |
|---|---|---|---|
| N.A. | N.A. | 60 | |

MICROFILM COPY AVAILABLE
YES ■ NO □

COPYRIGHT GRANTED
YES □ NO ■

COPYRIGHT RELEASE FILED
YES □ NO □

TYPE OF REPORT
PROPOSAL □
IN-PROGRESS □
FINAL ■
FOLLOW-UP □

OTHER ERIC REFERENCES:

ERIC SATELLITE CODE

B. INDEXING DATA

14. SUBJECT AREA

15. TYPE OF ENDEAVOR
Abstract

16. INDEXING TERMS (6-12)

| | | | | |
|---|---|---|---|---|
| | science | teaching methods | | |
| abstracts | chemistry | | | |
| experimental studies | laboratories | | | |

17. ABSTRACT (MAX. 250 WORDS)

An abstract of a study of experiment planning in college general chemistry.

ERIC No.

18. SOURCE OF ABSTRACT

C. FUNDING DATA

19. SUPPORTING ORGANIZATION

20. DIVISION OR DEPT.

21. CONTRACT NO.
PROJECT NO.

22. TOTAL COST OF PROJECT

23. DURATION OR PROJECT

U.S. Department of Health, Education, and Welfare
Office of Education

ERIC Form 1

IV-5 (Science)

IV -5 (Science)

Sponsoring Committee: Professor J. Darrell Barnard, Chairman
Professor Louise Antz and Professor Edward L. Kemp

An Abstract of:

# A STUDY OF EXPERIMENT PLANNING IN COLLEGE GENERAL CHEMISTRY,

- - - - - -

## " An Investigation of the Persistence of an Indoctrinated Pattern of Experiment Planning Subsequent to the Indoctrination Period, "

WARREN ANTHONY McMULLEN .

ED000534

Submitted in partial fulfillment of the
requirements for the degree of Doctor of
Philosophy in the School of Education of
New York University

Greenville College

U. S. DEPARTMENT OF HEALTH, EDUCATION AND WELFARE
Office of Education

This document has been reproduced exactly as received from the person or organization originating it. Points of view or opinions stated do not necessarily represent official Office of Education position or policy.

1960

In light of (1) the desirability of providing for students laboratory experiences that are so similar to scientific research as (a) to help laymen understand the function of science in society, and (b) to train scientists who are better able to copy with problems which they meet in their work, and in light of (2) the controversy over the existence of "the scientific method" (the existence of a widely used sequence of steps in attacking problems), this study has determined the extent to which the experiment-planning patterns of a group of students in college general chemistry followed a recommended pattern subsequent to an indoctrination period.

Prior studies of student-planned experiments have shown that students tended to gain more skill in laboratory manipulation, more skill in certain aspects of scientific thinking, and more interest in science from such experiments than from more conventional laboratory work. Previous studies of problem solving have observed behavior patterns in simulated problem situations of low to moderate complexity.

There were four stages in this study. First, a recommended pattern of experiment-planning was derived from literature on skillful thinking. This pattern, a series of five steps to be followed, was embodied in a students' guide entitled Explorations in Chemistry. This guide was prepared to aid in indoctrinating students in the use of the pattern, to guide them in developing good laboratory manipulative techniques and good habits of recording and reporting laboratory work, and to provide problems to be used as the basis for planning experiments.

Second, the 1957-58 general chemistry class at Greenville College was indoctrinated in the use of the recommended pattern of experiment-planning through the use of Explorations in Chemistry and through group work in devising experiments to test hypotheses as to solutions of four problems. Then each student was assigned his own series of problems for which experimental tests of proposed solutions were to be planned. Throughout the course, students kept specified records of their own activities as they planned experiments.

Third, the student records of planning were studied to derive the pattern of experiment-planning used by each student for each experiment. Criteria for classification of items in these records were secured by adapting material on the planning steps in Explorations in Chemistry. The criteria and their use in deriving patterns were validated by a jury. The reproducibility of the derived patterns was demonstrated.

Fourth, the derived patterns were examined to determine their likeness to the recommended pattern. For the class as a whole, there was no tendency to follow the indoctrinated pattern during the three quarters of the course following indoctrination more frequently than to follow all alternative patterns combined. Individual students showed wide variation in their tendency to follow the recommended pattern. From zero to one hundred percent of a given individual's patterns were like the recommended pattern. Forty-three percent of the patterns which were found were like the recommended one. The correlations between a given student's percent of patterns like the recommended one and the following were found to be not significantly different from zero:

Percentile ranks on the American Council on Education Psychological Examination

Scores on the American Council on Education Test of Critical Thinking

Scores on the American Chemical Society General Chemistry Test

Over eighty-five percent of the post-indoctrination patterns were either like the recommended pattern or omitted only the first of the five planning steps.

This study could well be followed by a series of studies to check its findings and to extend them to other subject matter fields and to chemistry as well as to other sciences for longer periods of time.

Christian Culture in Education

# Greenville College

GREENVILLE, ILLINOIS

Office of the Dean

May 5, 1960

Commissioner of Education
Office of Education
Department of Health, Education, & Welfare
Washington 25, D. C.

Attention Mrs. Ann Bennet

Dear Mrs. Bennet:

In your letter of November 19, 1959, you requested a copy of the report on "studying chemistry students' tendency to use a stated sequence of steps in planning experiments". We have just received this report and are glad to enclose a copy for your use.

Yours sincerely,

Ruth Postlewait

(Miss) Ruth Postlewait, Secretary to
Edwin L. Lyle, Acting Dean

Enc.